

# Qualitative vs Quantitative Research

A student-friendly guide to comparing research approaches, choosing appropriate methods, and interpreting evidence.

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Research Methods

# Lecture Overview

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Core comparison

Methods & data

Examples

Ethics & quality

This lecture explains how qualitative and quantitative research differ, where they overlap, and how researchers can select the most appropriate approach for a study.

## Students will learn to compare

purposes, questions, samples, data collection, analysis, quality criteria, ethical concerns, and reporting styles.

## Instructors can use it for

classroom explanation, research proposal training, thesis preparation, and method selection workshops.

## The lecture ends with

a realistic research scenario, practical exercises, discussion questions, and a knowledge check.

# Learning Objectives

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- Define qualitative research, quantitative research, and mixed methods research.
- Differentiate the purpose, data, sampling, and analysis logic of both approaches.
- Identify research questions that are better suited to qualitative or quantitative inquiry.
- Compare strengths, limitations, ethical issues, and quality criteria.
- Choose an appropriate approach for a research problem and justify the choice.
- Interpret a realistic research scenario using qualitative and quantitative reasoning.

*Measurable outcome: students should be able to explain, compare, apply, and justify methodological choices.*

# Introduction: Why the Difference Matters

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Qualitative and quantitative research are two broad ways of producing academic evidence. They differ in the type of questions they answer, the data they collect, and the logic they use to reach conclusions.

## QUALITATIVE

Explores meaning, experience, context, and process.

## QUANTITATIVE

Measures variables, tests relationships, and estimates patterns.

**Choosing the wrong approach can lead to weak conclusions, mismatched data, inappropriate analysis, and unclear contribution.**

# Key Definitions

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## Qualitative research

A research approach that uses non-numerical data—such as interviews, observations, documents, images, or open-ended responses—to understand meanings, experiences, processes, or social contexts.

## Quantitative research

A research approach that uses numerical data to measure variables, test hypotheses, estimate relationships, compare groups, or generalize findings to a wider population.

## Variable

A characteristic that can change or vary, such as age, income, motivation, test score, satisfaction, or response time.

## Theme

A meaningful pattern found in qualitative data, often built from coded words, phrases, events, or participant experiences.

## Mixed methods

A research approach that intentionally combines qualitative and quantitative data to produce a more complete understanding.

# Background and Context

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The distinction between qualitative and quantitative research is connected to deeper debates about how knowledge is produced.

## 1 Quantitative traditions

Influenced by measurement, experiments, surveys, statistical inference, and positivist thinking.

## 2 Qualitative traditions

Influenced by interpretivism, constructivism, fieldwork, ethnography, and meaning-making.

## 3 Contemporary research practice

Many fields now use both approaches, either separately or in mixed methods designs.

**Modern research methods training emphasizes methodological fit: the approach should match the research question, context, data, and intended contribution.**

Good methodology is not about choosing a “side”; it is about building a defensible pathway from question to evidence.

# Main Concept: Two Logics of Evidence

## Qualitative logic

- Begins with a broad question
- Collects rich, detailed data
- Looks for meanings and patterns
- Builds explanations from context

**Inductive emphasis: observations → categories → themes → interpretation**

## Quantitative logic

- Begins with variables or hypotheses
- Collects structured numerical data
- Uses statistics to compare or test
- Seeks patterns that may generalize

**Deductive emphasis: theory → hypothesis → measurement → statistical test**

# Qualitative Research: Core Features

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Qualitative research is useful when researchers want to understand how people interpret experiences, how processes unfold, or why a phenomenon happens in a particular context.

## Data

Words, narratives, observations, documents, audio, images

## Researcher role

Often close to participants and context

## Design

Flexible and iterative; can adapt as understanding develops

## Output

Themes, categories, models, rich description, interpretation

**Example: Interviewing first-generation university students to explore how they experience academic belonging.**

# Quantitative Research: Core Features

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Quantitative research is useful when researchers want to measure variables, estimate the size of an effect, compare groups, test hypotheses, or predict outcomes.

## Data

Numbers: scores, counts, ratings, percentages, frequencies

## Researcher role

Usually more distant from participants and standardized procedures

## Design

Structured; variables and instruments defined in advance

## Output

Statistics, tables, graphs, effect estimates, accepted/rejected hypotheses

**Example: Surveying 500 students to test whether study hours predict exam performance.**

# Qualitative vs Quantitative Research: Comparison Table

| Dimension        | Qualitative Research                           | Quantitative Research                                        |
|------------------|------------------------------------------------|--------------------------------------------------------------|
| Main purpose     | Understand meanings, experiences, and contexts | Measure variables, test relationships, and estimate patterns |
| Typical question | How? Why? What is the experience?              | How many? How much? What effect? What relationship?          |
| Data type        | Words, images, observations, documents         | Numbers, scores, ratings, counts                             |
| Sampling         | Small, purposive, information-rich             | Larger, structured, often probability-based                  |
| Analysis         | Coding, themes, interpretation                 | Descriptive and inferential statistics                       |
| Common output    | Themes, narrative explanations, models         | Tables, graphs, coefficients, p-values, effect sizes         |

# Philosophical Assumptions

Research approaches often reflect assumptions about reality, knowledge, values, and methods. Students do not need to memorize labels, but they should understand how assumptions shape design choices.

| Ontology     | What is the nature of reality? | Multiple realities shaped by experience   | One measurable reality, or variables that can be observed |
|--------------|--------------------------------|-------------------------------------------|-----------------------------------------------------------|
| Epistemology | How do we know?                | Knowledge is interpreted through context  | Knowledge is tested through measurement and evidence      |
| Axiology     | Role of values                 | Researcher reflexivity is important       | Researcher seeks neutrality and standardization           |
| Methodology  | How to investigate?            | Flexible, inductive, naturalistic designs | Structured, deductive, statistical designs                |

# Research Questions and Hypotheses

**Research questions are the bridge between a problem and a method.**

## Qualitative questions

Ask about experiences, meanings, interpretations, processes, or social contexts. They are often open-ended and exploratory.

**Qualitative example: How do remote workers describe the impact of flexible work on work-life boundaries?**

## Quantitative questions

Ask about measurement, frequency, comparison, prediction, association, or causal effects. They often use variables and hypotheses.

**Quantitative example: Is the number of remote-work days associated with employee job satisfaction scores?**

*Hypotheses are most common in quantitative studies, but qualitative studies can still be guided by concepts, frameworks, or sensitizing ideas.*

# Data Types and Measurement

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The most visible difference between qualitative and quantitative research is the form of data, but the deeper difference is how those data are used to support claims.

## Qualitative data

- Interview transcripts
- Field notes and observations
- Open-ended survey answers
- Policy documents, diaries, social media posts

## Quantitative data

- Test scores and grades
- Likert-scale responses
- Website analytics and click counts
- Clinical measurements or laboratory values

**Measurement quality matters: a number is only useful if the variable is clearly defined and measured appropriately.**

# Sampling Strategies

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Sampling decisions affect credibility, transferability, representativeness, and the scope of conclusions.

## Qualitative sampling

Often purposive: participants are selected because they can provide rich, relevant, and diverse information about the phenomenon.

### Common qualitative sampling types

- Purposive
- Snowball
- Maximum variation
- Theoretical sampling

## Quantitative sampling

Often probability-based or structured: participants are selected to support estimation, comparison, and possible generalization.

### Common quantitative sampling types

- Simple random
- Stratified random
- Cluster sampling
- Systematic sampling

# Data Collection Methods

Data collection should align with the question, participants, ethics, and analysis plan.

| Qualitative methods  | Interviews         | Focus groups | Observation        | Document analysis  | Open-ended questionnaires |
|----------------------|--------------------|--------------|--------------------|--------------------|---------------------------|
| Quantitative methods | Structured surveys | Experiments  | Standardized tests | Secondary datasets | Sensor or system logs     |

**Design tip:** Before collecting data, decide exactly what evidence is needed and how each item will help answer the research question.

# Data Analysis Methods

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Analysis transforms raw data into meaningful findings. The two approaches use different techniques, but both require systematic procedures.

## **Q** Qualitative analysis

Transcribe, read, code, group codes, identify themes, interpret meanings, and support claims with evidence.

## **N** Quantitative analysis

Clean data, describe variables, test assumptions, run statistical analyses, interpret estimates and uncertainty.

### Common qualitative techniques

- Thematic analysis
- Content analysis
- Narrative analysis
- Grounded theory coding

### Common quantitative techniques

- Descriptive statistics
- Correlation and regression
- t-tests and ANOVA
- Chi-square tests

# Quality Criteria

Each approach has standards for assessing whether the study is well-designed and whether conclusions are defensible.

| Qualitative quality                                                         | Quantitative quality                                               |
|-----------------------------------------------------------------------------|--------------------------------------------------------------------|
| Credibility: findings are believable and grounded in data                   | Validity: the instrument measures what it should measure           |
| Transferability: context is described enough for readers to judge relevance | Reliability: measurement is consistent and repeatable              |
| Dependability: procedures are documented and traceable                      | Internal validity: design supports the claimed relationship        |
| Confirmability: findings are not only the researcher’s preference           | External validity: findings can reasonably apply beyond the sample |

# Types of Qualitative Research Designs

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## Phenomenology

Explores lived experiences and meanings

## Grounded theory

Builds theory from systematically collected data

## Ethnography

Studies culture, groups, and everyday practices

## Case study

Examines a bounded case in depth

## Narrative research

Analyzes stories and life experiences

**Selection principle: choose the design that best fits the phenomenon, field setting, participant experience, and expected contribution.**

# Types of Quantitative Research Designs

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## Descriptive

Describes frequencies, averages, or patterns

## Correlational

Examines relationships between variables

## Causal-comparative

Compares existing groups without manipulation

## Experimental

Manipulates an intervention and controls conditions

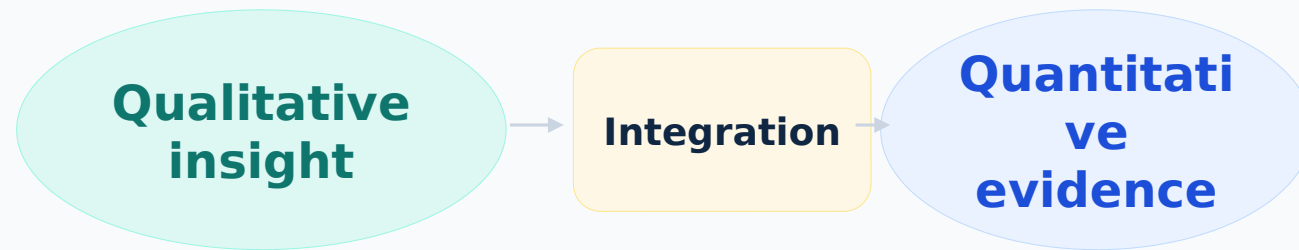
## Quasi-experimental

Tests interventions when random assignment is not feasible

**Selection principle: choose the design that matches the research question, control needs, ethical limits, and feasibility of measurement.**

# Mixed Methods: Combining Both Approaches

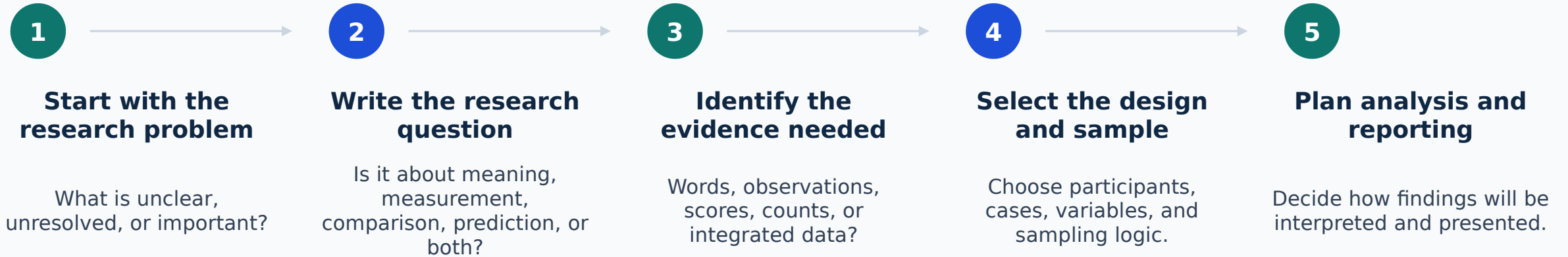
Mixed methods research intentionally integrates qualitative and quantitative data within one study or program of research.



- Convergent: collect both types in parallel and compare results
- Explanatory sequential: quantitative results followed by qualitative explanation
- Exploratory sequential: qualitative exploration followed by quantitative measurement

**Use mixed methods when one kind of data is not enough to answer the research question fully.**

# Step-by-Step Process: Choosing an Approach



**Decision rule: if the study needs explanation and meaning, lean qualitative; if it needs measurement and testing, lean quantitative; if it needs both, consider mixed methods.**

# Step-by-Step Qualitative Workflow

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## 1 Define phenomenon

Clarify what experience, process, or context is being explored.

## 2 Select participants

Use purposive or relevant sampling to find information-rich cases.

## 3 Collect rich data

Use interviews, observations, documents, or open-ended responses.

## 4 Code and interpret

Identify patterns, develop themes, and connect findings to literature.

## 5 Report evidence

Use clear descriptions and selected quotations or examples.

# Step-by-Step Quantitative Workflow

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- 1 Define variables**  
Operationalize concepts into measurable indicators.
- 2 State questions or hypotheses**  
Specify expected relationships, differences, or predictions.
- 3 Design instrument and sample**  
Choose survey items, tests, groups, or datasets.
- 4 Collect and clean data**  
Check missing values, coding, outliers, and assumptions.
- 5 Analyze and interpret**  
Use appropriate statistics and explain practical meaning.

# Practical Examples Across Disciplines

| Discipline             | Qualitative example                                     | Quantitative example                                      |
|------------------------|---------------------------------------------------------|-----------------------------------------------------------|
| Social sciences        | Interview migrants about identity and belonging         | Survey 1,000 residents about attitudes toward migration   |
| Business               | Analyze managers’ experiences of digital transformation | Test whether training hours predict employee productivity |
| Education              | Observe classroom interaction during group work         | Compare exam scores before and after an intervention      |
| Health sciences        | Explore patient experiences of chronic pain care        | Estimate association between exercise and blood pressure  |
| Psychology             | Study how students describe anxiety triggers            | Measure anxiety scores across treatment groups            |
| Information technology | Interview users about usability frustrations            | Analyze task completion time and error rates              |

# Research Example: Applying Both Approaches

**Topic: The effect of online learning environments on university students’ academic engagement**

|                         |                                                                                  |
|-------------------------|----------------------------------------------------------------------------------|
| Research problem        | Many students attend online courses, but engagement varies widely.               |
| Qualitative question    | How do students describe barriers and supports for engagement in online classes? |
| Quantitative question   | Is perceived instructor feedback associated with engagement scores?              |
| Participants            | Undergraduate students enrolled in online or blended courses.                    |
| Data collection         | Interviews with 20 students plus a structured survey with 300 students.          |
| Analysis                | Thematic analysis for interviews; correlation/regression for survey data.        |
| Expected interpretation | Interview themes explain the mechanisms behind statistical relationships.        |

# Advantages and Limitations

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No approach is universally superior. Each offers different strengths and creates different limitations.

## Advantages

- Qualitative: depth, context, participant voice, theory development
- Quantitative: precision, comparison, generalization, statistical testing
- Mixed methods: broader and more complete understanding

## Limitations

- Qualitative: time-intensive, limited generalization, researcher influence
- Quantitative: may oversimplify experience, depends on measurement quality
- Mixed methods: more complex design, analysis, and integration demands

**Methodological skill means knowing what an approach can and cannot claim.**

# Common Mistakes and Best Practices

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Beginning researchers often select a method before clarifying the research question. Good design reverses this order.

## Common mistakes

- Calling any open-ended question “qualitative” without analysis
- Using small convenience samples for broad statistical claims
- Confusing correlation with causation
- Choosing tests or themes after seeing preferred results

## Best practices

- Match question, data, sampling, and analysis
- Describe procedures clearly enough for readers to evaluate
- Use valid instruments and transparent coding methods
- Interpret findings within the limits of the design

# Ethical Considerations

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Ethics applies to both approaches. The specific risks differ depending on the type of data, participants, and topic.

## Informed consent

Participants should understand the purpose, procedures, risks, and voluntary nature of the study.

## Confidentiality

Protect identities in interview quotes, datasets, recordings, and stored documents.

## Privacy and data security

Store recordings, transcripts, survey data, and identifiers securely.

## Bias and fairness

Avoid leading interview questions, biased instruments, or selective reporting.

## Transparency

Report methods honestly, including limitations, missing data, and analytic decisions.

# Activity: Choose the Right Approach

## Activity objective

Students practice matching a research question with qualitative, quantitative, or mixed methods design.

## Instructions

1. Work individually or in groups of 3–4.
2. Choose one topic: student motivation, customer satisfaction, patient experience, workplace stress, or app usability.
3. Write one qualitative question and one quantitative question for the topic.
4. Choose data collection and analysis methods for each question.
5. Prepare a 2-minute explanation of why each method fits.

## Expected outcome

Students should be able to justify method choice using the research question, data type, sample, and analysis plan.

# Discussion Questions

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- Can a qualitative study be rigorous without using statistics? Why or why not?
- When might a large quantitative sample still produce weak conclusions?
- How can researchers reduce bias in interviews and surveys?
- What kinds of research questions require both qualitative and quantitative evidence?
- How should researchers report findings that do not support their expectations?
- What makes a finding transferable, generalizable, or useful?
- How do ethics concerns differ between interview data and survey data?

# Knowledge Check

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Answer the questions individually, then compare answers with a partner.

1. Which approach is most suitable for exploring lived experiences?
2. Which approach commonly uses hypotheses and statistical tests?
3. What is one advantage of purposive sampling?
4. What is the main purpose of operationalizing a variable?
5. What is thematic analysis used for?
6. Why is correlation not the same as causation?
7. Name one quality criterion for qualitative research.
8. Give one example of a mixed methods design.

# Answer Key

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1. Qualitative research.
2. Quantitative research.
3. It selects information-rich participants who can speak directly to the phenomenon.
4. To turn an abstract concept into a measurable indicator.
5. To identify, analyze, and interpret patterns or themes in qualitative data.
6. Correlation shows association; causation requires stronger design logic and control of alternatives.
7. Credibility, transferability, dependability, or confirmability.
8. Convergent, explanatory sequential, or exploratory sequential mixed methods design.

# Key Takeaways

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**Qualitative and quantitative research are complementary approaches for answering different kinds of questions.**

1

Qualitative research explains meanings, experiences, context, and process.

2

Quantitative research measures variables, tests relationships, and estimates patterns.

3

The research question should guide the approach, not convenience or preference.

4

Both approaches require clear design, ethical practice, and transparent reporting.

5

Mixed methods can integrate depth and measurement when the question requires both.

**Conclusion: Strong research is not defined by using numbers or words alone; it is defined by the quality of the match between problem, question, evidence, analysis, and interpretation.**

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# Thank You

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